Shell Scripting

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(content ~~stolen~~ based off the slides by Ian McDonald)

Course resources

- Your facilitators!
- All material (new & old) is online at decal.ocf.io
- Office hours + demos during the in-person lecture time - 8pm PST in ocf.io/decalzoom
- Email us or drop by in #decal-general via Slack, IRC, Discord, Matrix, etc.

Engaging with this lecture

- Follow slides online: ocf.io/decal/slides/b3
- Connect to login server:
  - `$OCF_USERNAME@ssh.ocf.berkeley.edu`
- Ask questions!
  - Yell at your screen
  - On #decal-general in Slack
  - Lectures are a lot more fun when you ask questions.

Topics

What's on the menu?

1. Bash
2. Variables
3. Conditionals
4. Loops
5. Functions
6. Streams

But why?

Good question

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- You’re a sysadmin

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- You have to run some commands all the time

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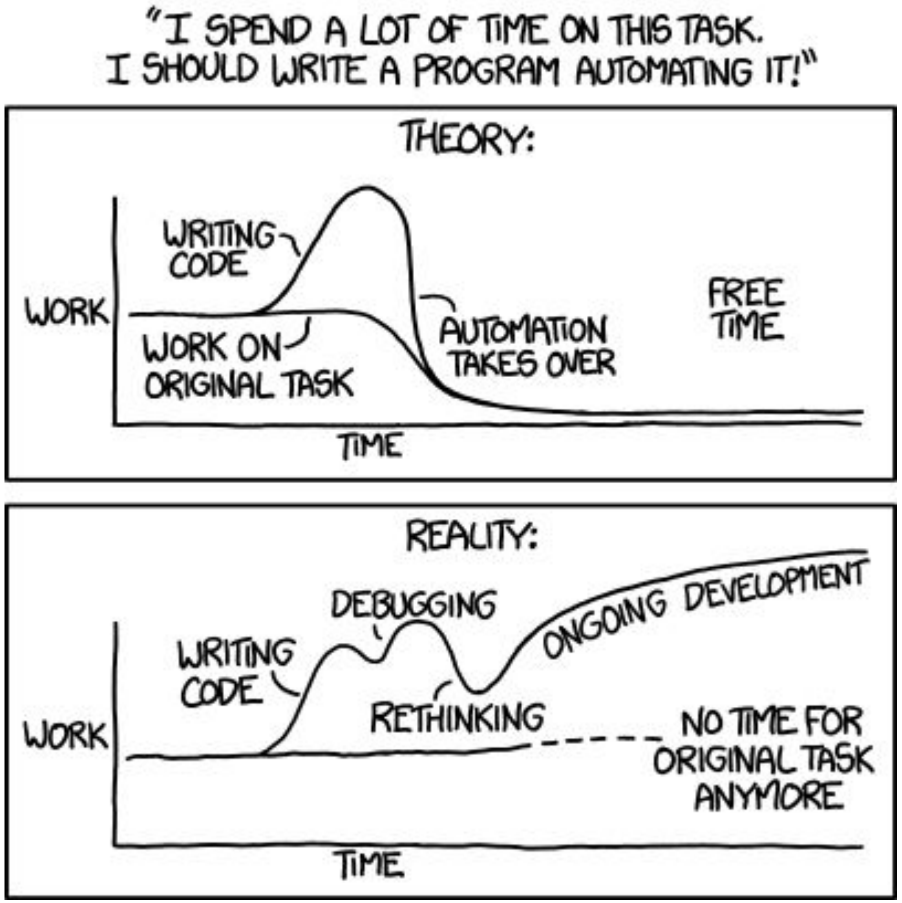
- But you want to be ~~lazy~~ DRY

But why?

Good question

- You're a sysadmin
- You have to run some commands all the time
- But you want to be ~~lazy~~ DRY
- Describe your task as a step-by-step set of instructions so that a computer can do it for you!


"I SPEND A LOT OF TIME ON THIS TASK. I SHOULD WRITE A PROGRAM AUTOMATING IT!"
THEORY:
WRITING CODE
WORK
WORK ON ORIGINAL TASK
AUTOMATION TAKES OVER
FREE TIME
TIME
REALITY:
DEBUGGING
WRITING CODE
ONGOING DEVELOPMENT
RETHINKING
WORK
NO TIME FOR ORIGINAL TASK ANYMORE
TIME

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Bash

A shell

Bash

A shell...

And also a programming language!

Comments

Use a pound/sharp/hashtag

```
# This is a comment
```

Shebang!

- Determines the program used to execute the lines below

```
#! /path/to/interpreter

#! /bin/bash

#! /bin/sh

#! /usr/bin/python
```

Running Your Script

- Remember to make your script executable

```
# Make executable
chmod +x your-script.sh

# Run script!
./your-script.sh
```

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shell variables

- Whitespace matters!
- Variable interpolation with $
- Display text with `echo`

```
NAME="value"
echo "$NAME"
```

shell variables

- Types? What types?
- Bash variables are untyped

```
FOO=1
$FOO  +  1
```

shell variables

- Types? What types?
- Bash variables are untyped
- Operations are contextual

```
FOO=1
$FOO + 1
error!
```

shell variables

- Use the `expr` command to evaluate expressions

```
FOO=1
expr $FOO + 1
2
```

User input

- Use the `read` command get user input
- “-p” is for the optional prompt

```
read -p “send: ” FOO
# enter “hi”
echo “sent: $FOO”
sent: hi
```

subshell

- Command substitution allows you to use another command’s output to replace the text of the command

```
FOO=$(expr 1 + 1)
echo “$FOO”
2
```

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test

test test mic check

- Evaluates an expression
- Also synonymous with [ ]
- Sets exit status to
    - 0 (true)
    - 1 (false)

test

test test mic check

- Evaluates an expression
- Also synonymous with [ ]
- Sets exit status to
  - 0 (true)
  - 1 (false)

(Yup you read that right)

test

Lots of comparators

`-eq`	`==`
`-ne`	`!=`
`-gt`	`>`
`-ge`	`>=`
`-lt`	`<`
`-le`	`<=`

test

Examples

```
test zero = zero; echo $?

test zero = one; echo $?
```

test

Examples

```
test zero = zero; echo $?
0 # 0 means true
test zero = one; echo $?
1 # 1 means false
```

test

Examples

```
[0 -eq 0]; echo $?
0 # 0 means true
[0 -eq 1]; echo $?
1 # 1 means false
```

if

What if...?

```
if [ “$1” -eq 69 ];
then
    echo “nice”
fi
```

if-else

…And what ifn’t

```
if [ “$1” -eq 69 ];
then
    echo “nice”
else
    echo “darn”
fi
```

elif

…And what ifn’t but if

```
if [ “$1” -eq 69 ];
then
   echo “nice”
elif [ “$1” -eq 42 ];
then
   echo “the answer!”
else
   echo “wat r numbers”
fi
```

case

No one likes long if statements

```
read -p "are you 21?" ANSWER
case "$ANSWER" in
  “yes”)
    echo "i give u cookie";;
  “no”)
    echo "thats illegal";;
  “are you?”)
    echo “lets not”;;
  *)
    echo "please answer"
esac
```

Topics

What's on the menu?

for loops

```
NAMES="a b c d"
for NAME in $NAMES
do
  echo "Hello $NAME"
done
```

while loops

```
while true
do
  echo "Hello $NAME"
done
```

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functions

```
function greet() {
  echo “hey there $1”
}
greet “Richard”

hey there Richard
```

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Redirection

Use **>** to output to a file

```
echo “hello” > file
```

Redirection

Use < to take input from a file

```
sort < file
```

Pipes

```
command1 | command2
```

Take output of first command and “pipe” it into the second one, connecting stdin and stdout

C’est n’est pas une pipe

Additional Notes

- Python
  - `argparse`: easy CLI
  - `fabric`: easy deployment
  - `salt`: generally useful for infrastructure-related tasks
  - `psutil`: monitor system info
- Use **bash** when the functionality you want is easily expressed as a composition of command line tools
  - Common file manipulation operations
- Use **Python** when you need "heavy lifting" with complex control structures, messy state, recursion, OOP, etc.

Other Resources

- AT&T Archives: The UNIX Operating System
- Knuth and McIlroy Word Count
- Linux Documentation Project: Bash Guide for Beginners
- Honestly, Google is your best friend